REMARKS/ARGUMENTS

Reconsideration and allowance of this application are respectfully requested. Currently, claims 1-12 are pending in this application.

Allowable Subject Matter:

The Office Action indicated that claims 4-10 and 12 were objected to as being dependent upon a rejected base claim, but held that these claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. By this Amendment, claims 4, 6 and 12 have been rewritten in independent form. Claim 5 depends from claim 4 and claims 7-10 depend at least indirectly from claim 6. Claims 4-10 and 12 are therefore allowable.

Rejections Under 35 U.S.C. §103:

Claims 1 and 11 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over either Crawford et al (U.S. '165, hereinafter "Crawford") or Hagiwara et al (JP '427, hereinafter "Hagiwara")[1] in view of Vora et al (U.S. '825, hereinafter "Vora"). Applicant respectfully traverses this rejection.

In order to establish a prima facie case of obviousness, all of the claim limitations must be taught or suggested by the prior art. Applicant respectfully submits that the combination of Crawford (or Hagiwara) in view of Vora fails to teach or suggest all of the claim limitations. For example, the combinations of cited references fail to teach or suggest a slot armor component comprising a plurality of

[1] An English translation of Hagiwara is attached hereto.

profile co-extruded polymer layers, as explicitly required by claim 1 and claims 2-3 and 11 which depend therefrom.

This feature is supported by, for example, paragraph [0035] of the originally-filed specification which states in part:

> "Polymer layers 1-3 are chemically bonded together through a profile co-extrusion process. Polymer layers 1-3 are thus chemically bonded together through a melt stage of the profile co-extrusion process so that no adhesive is needed for bonding at the interfaces between polymer layers 1 and 2 and polymer layers 1 and 3."

The Office Action alleges "Crawford, or individually alternate ref Hagiwara, each discloses a slot armor comprising a plurality of profile co-extruded polymer layers (Crawford's 37 & 39, Hagiwara's 3a1-3a2)...." (See page 2, last paragraph of the Office Action). Applicant disagrees with this allegation.

Crawford discloses adjacent sheets 37 and 39 formed of dielectric material. While adjacent sheets 37 and 39 are associated in an overlaying relationship, Crawford fails to disclose or even suggest that sheets 37 and 39 form a profile of co-extruded polymer layers. Indeed, instead of sheets 37 and 39 being chemically bonded together through a profile co-extruded process, sheets 37 and 39 are associated with each other by engaging cuffs 69, 69a on sheet 39 to opposite marginal edges 55, 55a of sheet 37. (See col. 7, lines 56-68 and Fig. 5). Sheets 37 and 39 are therefore not profile co-extruded polymer layers.

Similarly, layers 3a1 and 3a2 of Hagiwara are not profile co-extruded polymer layers. As will be appreciated from the attached English translation, no portion of

Hagiwara discloses profile co-extruded polymer layers at all. If anything, Figs. 2 and 3 illustrating layers 3a1 and 3a2 suggest that these layers are not profile co-extruded polymer layers. For example, layer 3a1 is shown as having apertures 9, whereas layer 3a2 does not include any such apertures.

The Office Action fails to provide any specific support that layers 37 and 39 of Crawford and/or layers 3a1 and 3a2 of Hagiwara disclose profile co-extruded polymer layers. Applicant submits that there is no such teaching in either of these references. If the Examiner maintains the rejection in view of these references, Applicant respectfully requests that the next Office Action specifically identify (i.e., what col. and line number(s) and/or what Fig(s).) of Crawford and/or Hagiwara discloses this feature.

Vora discloses "The polymers may be cast as films useful as wire and cable wraps, motor slot liners or flexible printed circuit substrates." (See col. 11, line 67 to col. 12, line 11). However, Vora fails to teach or suggest a profile of co-extruded polymer layers. Accordingly, Vora fails to remedy the above described deficiencies of Crawford and Hagiwara. Even if any of these references were combined as proposed by the Office Action, the combination would not have taught or suggested all of the claim limitations.

Accordingly, Applicant respectfully submits that claims 1 and 11 are not "obvious" over Crawford or Hagiwara in view of Vora and respectfully requests that the rejection of these claims under 35 U.S.C. §103 be withdrawn.

Claims 2-3 were rejected under 35 U.S.C. §103 as allegedly being unpatentable over Crawford or Hagiwara in view of Vora and further in view of Kaminski (U.S. '064). Applicant respectfully traverses this rejection. Since claims 2-3 depend from claim 1, all of the arguments made above with respect to claim 1 apply equally to claims 2-3. Kaminski fails to remedy the above described deficiencies of Crawford, Hagiwara and Vora. Applicant therefore respectfully requests that the rejection of these claims under 35 U.S.C. §103 be withdrawn.

Conclusion:

Applicant believes that this entire application is in condition for allowance and respectfully requests a notice to this effect. If the Examiner has any questions or believes that an interview would further prosecution of this application, the Examiner is invited to telephone the undersigned.

Respectfully submitted,

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Stator for Rotary Electric Machine 1

ABSTRACT/PURPOSE:
To reduce the abrasion of the coil insulating layer of a stator coil due to thermal expansion or contraction, by forming slot liners with the two lavers of a coil side slot liner on the stator coil side and a core side slot liner on the stator core side.

明　　細　　書

発明の名称　回転電機の固定子

特許請求の範囲

1．固定子鉄心と、この固定子鉄心のスロット内に挿入された固定子コイルと、これら固定子コイルと固定子鉄心との間に挿入されたスロットライナーとを備えた回転電機の固定子において、前記スロットライナーを、前記固定子コイル側のコイル側スロットライナーと、前記固定子鉄心側の鉄心側スロットライナーとの２層で形成すると共に、前記コイル側スロットライナーを、その壁面に孔を設け、かつ潤滑材で処理したことを特徴とする回転電機の固定子。

２．前記潤滑材が乾性潤滑材、半導電性添加材の少なくとも前記乾性潤滑材である特許請求の範囲第１項記載の回転電機の固定子。

発明の詳細な説明

Field of the invention:
(1) A stator is provided with a stator core 1, a stator coil 2 are into the slot of the stator core 1, slot liners 3a inserted between the stator core 1 and the stator coil 2, and the like. The slot liners 3a are formed with the two layers of a coil side slot liner 3a1 on the stator coil 2 side and a core side slot liner 3a2 on the stator core 1 side. Slots 9 are arranged on the wall surface of the coil side slot liner 3a1, and the wall surface is treated with lubricant 10. As a result, the abrasion of the coil insulating layer of the stator coil due to thermal expansion or contraction is reduced.
(2) The lubricant is the combination of a kind of dry lubricant and a kind of semi-conduct lubricant or a kind of dry lubricant.

〔発明の利用分野〕

本発明の回転電機の固定子に関するものである。

Field of the invention:
A stator core of a stator

Stator for Rotary Electric Machine 2

〔発明の背景〕

第４図には回転電機の固定子の従来例が示されている。同図に示されているように固定子は固定子鉄心１、この固定子鉄心１のスロット内に挿入された固定子コイル２、これら固定子鉄心１と固定子コイル２との間に挿入されたスロットライナー３等を備えている。なお同図において４はスロット底用ライナー、５は層間ライナー、６はウエッジ下用調整ライナー、７はウエッジ、８はコイル絶縁層である。

このように構成された回転電機の固定子で固定子鉄心１のスロット内の固定子コイル２は、運転中の電磁力等の強制力や運転による温度上昇によってスロット内あるいはスロット外にも伸びる熱伸縮を生じて、その固定子コイル２の固定押圧力が低下する。また、固定子コイル２の熱伸縮による外被絶縁層とスロット壁あるいはスロット内介在絶縁層との摩擦により、コイル絶縁層８を摩耗する。

ところで、従来の固定子コイル２を包囲するスロットライナー３はスロット面との接触を高め、

接触不良によるグロー放電を防止し、スロット内に固定子コイル２を確実に押圧固定するもので固定子コイル２の熱伸縮に対しては無能で、固定子コイル２の長手方向の熱伸縮に対してコイル絶縁層８の保護が不備であつた。

Background of the invention:

Figure 4 shows the conventional stator core. Each parts are shown as Figure 4;

1: A stator is provided with a stator core

2: a stator coil inserted into the slot of the stator core 1

3: slot liners

3a: slot liners inserted between the stator core 1 and the stator coil 2

The slot liners 3a are formed with the two layers of a coil side slot liner 3a1 on the stator coil 2 side and a core side slot liner 3a2 on the stator core 1 side.

3a1: a coil side slot liner on the stator coil 2 side

3a2: a core side slot liner on the stator core 1 side

4: slot liners of the bottom part

5: liners of each layers

6: adjusted liner on the wedge

7: wedge

8: insulation layer of coil

9: slots (holes) arranged on the wall surface of the coil side slot liner 3a1 and the wall surface is treated with lubricant 10.

10: lubricant

A stator core 1 and a stator coil 2 get a thermal expansion because of electromagnetic field, electromagnetic induction, etc during driving and stopping.

The pressure of fixing on a stator coil 2 is reduced by the thermal expansion or contraction.

The abrasion of the coil insulating layer of the stator coil due to thermal expansion or contraction is reduced.

In the case of conventional stator, slot liners 3 have a function of protection glow electric discharge by the pressure of fixing on a stator coil 2 . The electric discharge will be occurred by a poor contact. But the slot liners 3 of conventional stator were incompetent for the protection of the reducing pressure of fixing on a stator coil 2 by the thermal expansion or contraction. There was no protection of the abrasion of the coil insulating layer 8 of the stator coil due to thermal expansion or contraction.

Stator for Rotary Electric Machine 3

〔発明の目的〕

本発明は以上の点に鑑みなされたものであり、熱伸縮による固定子コイルのコイル絶縁層の摩耗低減を可能とした回転電機の固定子を提供することを目的とするものである。

Purpose of the invention:
This invention is concerned about the above. To reduce the abrasion of the coil insulating layer of a stator coil due to thermal expansion or contraction, by forming slot liners with the two lavers of a coil side slot liner on the stator coil side and a core side slot liner on the stator core side.

〔発明の概要〕

すなわち本発明は固定子鉄心と、この固定子鉄心のスロット内に挿入された固定子コイルと、これら固定子コイルと固定子鉄心との間に挿入されたスロットライナーとを備えた回転電機の固定子において、前記スロットライナーを、前記固定子コイル側のコイル側スロットライナーと、前記固定子鉄心側の鉄心側スロットライナーとの２層で形成すると共に、前記コイル側スロットライナーを、その壁面に孔を設け、かつ潤滑材で処理したことを特徴とするものであり、これによつてスロットライナーは熱伸縮時の固定子コイルを円滑に摺動させるようになる。

Outline of the invention:
A stator is provided with a stator core 1, a stator coil 2 are into the slot of the stator core 1, slot liners 3a inserted between the stator core 1 and the stator coil 2, and the like. The slot liners 3a are formed with the two layers of a coil side slot liner 3a1 on the stator coil 2 side and a core side slot liner 3a2 on the stator core 1 side. Slots 9 (holes) are arranged on the wall surface of the coil side slot liner 3a1, and the wall surface is treated with lubricant 10. As a result, the abrasion of the coil insulating layer of the stator coil due to thermal expansion or contraction is reduced.

Stator for Rotary Electric Machine 4

〔発明の実施例〕

以下，図示した実施例に基づいて本発明を説明する。第１図から第３図には本発明の一実施例が示されている。なお従来と同じ部品には同じ符号を付したので説明を省略する。本実施例ではスロットライナー３ａを、固定子コイル２側のコイル側スロットライナー３ａ１と、固定子鉄心１側の鉄心側スロットライナー３ａ２との２層で形成すると共に，コイル側スロットライナー３ａ１はその盤面に孔９を設け、かつ潤滑材１０で処理した。このようにすることによりスロットライナー３ａは固定子コイル２側のコイル側スロットライナー３ａ１と、固定子鉄心１側の鉄心側スロットライナー３ａ２との２層で形成されると共に、コイル側スロットライナー３ａ１はその盤面に孔９が設けられ、かつ潤滑材１０で処理されるようになつて，スロットライナー３ａは熱伸縮時の固定子コイル２を円滑に摺動させるようになり，熱伸縮により固定子コイル２のコイル絶縁層８の摩耗低減を可能とした回転電機の固定子を得ることができる。

すなわちコイル側スロットライナー３ａ１（第２図参照）には表面に適当な間隔を介し，かつ適当な直径を持つ孔９を多数設ける。そしてこのスロットライナー３ａ１の表裏両面には四弗化エチレン、例えば日本バルカー製ユノンーＳなどを塗布して、孔９部およびその周辺部にこの潤滑材１０を包含させる，鉄心側スロットライナー３ａ２（第３図参照）は従来のものと同じであつてもよい。固定子コイル２はまずコイル側スロットライナー３ａ１で取り囲み、これを外側から更に鉄心側スロットライナー３ａ２で包囲する，このようにした後に、固定子鉄心１のスロットにスロット底用ライナー４をセットし、次いでスロットライナー３ａを装備した底側の固定子コイル２をセットし，セット後は層間ライナー５を置きスロットラスナー３ａを装備した上側の固定子コイル２を

Example of the invention:

Example of the invention is shown in Figure1, 2, 3. The number of the parts of the new stator (Figure 1) which is the same as conventional one (Figure 4). The explanation of these parts is omitted.

The slot liners 3a inserted between the stator core 1 and the stator coil 2 (shown as Figure 1).

The slot liners 3a are formed with the two layers of a coil side slot liner 3a1 on the stator coil 2 side and a core side slot liner 3a2 on the stator core 1 side (shown as Figure 1).

The coil side slot liner 3a1 on the stator coil 2 side has slots 9 (holes) arranged on the wall surface treated with lubricant 10 (shown as Figure 2).

The core side slot liner 3a2 is on the stator core 1 side (shown as Figure 1, 3).

The slot liners 3a make the stator coil 2 move smoothly, when they get the thermal expansion or contraction.

As a result, the abrasion of the coil insulating layer 8 of the stator coil due to thermal expansion or contraction is reduced.

The slots 9 (holes) on the coil side slot liner 3a1 leave a appropriate space and have a appropriate diameter (shown as Figure 2).

The ethylene fluoride (4), for example ‘Yun-no S’ produced by Valqua Industries in JAPAN, is painted on the both side of the coil side slot liner 3a1.

First, the stator coil 2 is wrapped by the coil side slot liner 3a1 (inside), and then, is wrapped by the core side slot liner 3a2 (outside).

And then, slot liners of the bottom part 4 and the stator coil 2 wrapped by the slot liners 3a are installed in the the stator 1.

Next, liners of each layers 5 and another stator coil 2 wrapped by the slot liners 3a are installed in the the stator 1.

Stator for Rotary Electric Machine 5

セットする．その後は順にウエッジ下用調整ライナー６の調整およびセット、ウエッジ７の打込みを行い、スロット内作業を完了する．このようにすることによりコイル側スロットライナー３ａ１の孔９部に潤滑材１０を包含できるので、固定子コイル２の熱伸縮に追従して潤滑材１０を固定子コイル２の表面および鉄心側スロットライナー３ａ２の表面に供給できるようになり、安定した固定コイル２の摺動ができ、コイル絶縁層８の摩耗を低減することができる．すなわちコイル側スロットライナー３ａ１と固定子コイル２および鉄心側スロットライナー３ａ２との滑り作用が向上するようになつて、固定子コイル２の長期的に摺動作用の維持が可能となり、スロットライナー３ａによる固定子コイル２の長手方向の熱伸縮に対するコイル絶縁層８の保護をよくすることができる．

なお本実施例では潤滑材１０に日本バルカー製ユノンーＳなどの乾性潤滑材を使用した場合について説明したが．乾性潤滑材に半導電性添加材を添加して使用するようにしてもよい．このようにすることによりスロット内のグロー放電の発生を抑制することができる．

Next, the adjusted liner on the wedge 6 and the wedge 7 are installed.
As a result, The slot liners 3a make the stator coil 2 move smoothly, when they get the thermal expansion or contraction. And
, the abrasion of the coil insulating layer 8 of the stator coil due to thermal expansion or contraction is reduced.

The stator coil 2 becomes very stable in the long term with sliding the coil side slot liner 3a1 and the core side slot liner 3a2.
And, the abrasion of the coil insulating layer 8 of the stator coil due to thermal expansion or contraction is reduced.

In this case, 'Yun-no S' produced by Valqua Industries are used.
Not only a dry lubricant but also a dry lubricant added to semi-conduct lubricant can reduce the electric discharge between the slot liner and a stator coil.

Stator for Rotary Electric Machine 6

〔発明の効果〕

上述のように本発明は熱伸縮による固定子コイルのコイル絶縁層の摩耗が低減されるようになつて、熱伸縮による固定子コイルのコイル絶縁層の摩耗低減を可能とした回転電機の固定子を得ることができる。

図面の簡単な説明

第１図は本発明の回転電機の固定子の一実施例の縦断側面図、第２図は同じく一実施例のコイル側スロットライナーの斜視図、第３図は同じく一実施例の鉄心側スロットライナーの斜視図、第４図は従来の回転電機の固定子の縦断側面図である。１…固定子鉄心、２…固定子コイル、３ａ…スロットライナー、３ａ１…コイル側スロットライナー、３ａ２…鉄心側スロットライナー、７…ウエッジ、８…コイル絶縁層、９…孔、１０…潤滑材。

代理人　弁理士　小川勝男

Effect of the invention :

As aforesaid, the abrasion of the coil insulating layer of the stator coil due to thermal expansion or contraction is reduced.

We can get a stator for rotary electric machine which has high-resistance of thermal expansion or contraction.

Figure 1 第１図

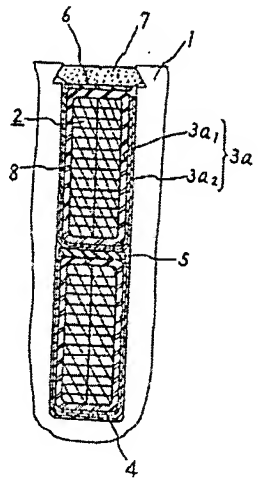


Figure 2 第２図

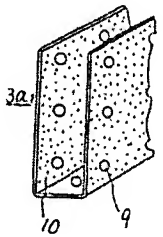


Figure 3 第３図

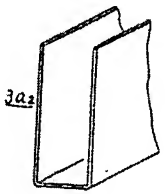
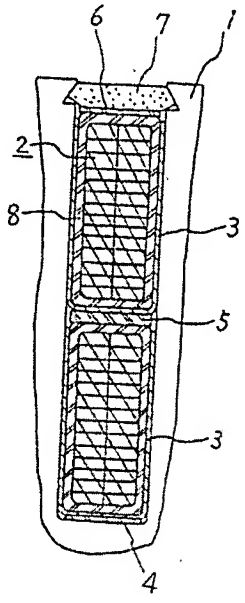


Figure 4 第４図



Explanation of the Figures:

1: A stator is provided with a stator core

2: a stator coil inserted into the slot of the stator core 1

3: slot liners

3a: slot liners inserted between the stator core 1 and the stator coil 2

The slot liners 3a are formed with the two layers of a coil side slot liner 3a1 on the stator coil 2 side and a core side slot liner 3a2 on the stator core 1 side.

3a1: a coil side slot liner on the stator coil 2 side

3a2: a core side slot liner n the stator core 1 side

4: slot liners of the bottom part

5: liners of each layers

6: adjusted liner on the wedge

7: wedge

8: insulation layer of coil

9: slots arranged on the wall surface of the coil side slot liner 3a1 and the wall surface is treated with lubricant 10.

10: lubricant